Rotational Motion
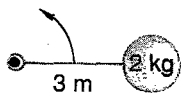
1) A point mass of 2 kilograms is attached to the end of a massless rod 3 meters long. The rod is pinned so that it is free to rotate about its other end. What torque is required to give the mass an angular acceleration of 6 radians per second squared?
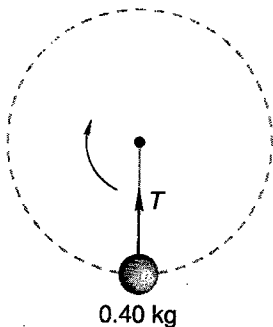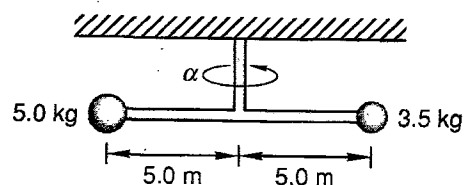
2) Three point masses are affixed to the surface of a massless table that can turn without friction about its center. The masses m_1, m_2, and m_3 are 1.0 kg, 2.0 kg, and 3.0kg, respectively. The lengths of r_1, r_2, and r_3 are 0.10 m, 0.20 m, and 0.30 m, respectively. What torque is required to give the system an angular acceleration of 4.0 radians per second per second about the center?
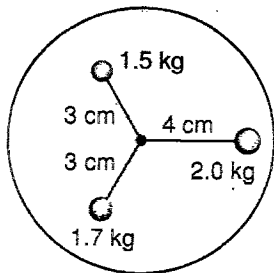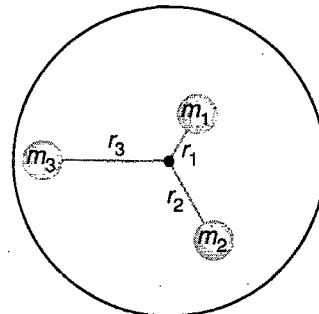
3) Three point masses are affixed to the surface of a massless table that can rotate without friction about its center, as shown. What torque is required to give the system an angular acceleration of 3.5 radians per second squared?
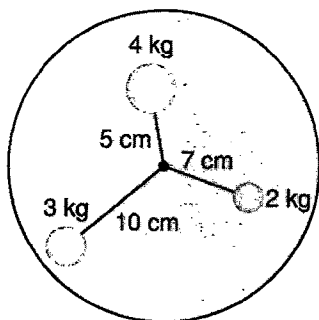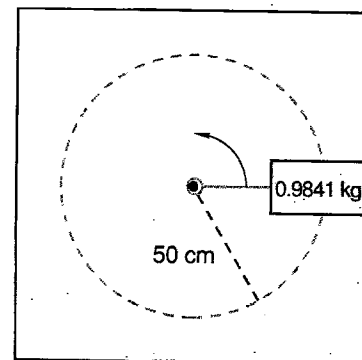
4) A 5.0-kilogram mass and a 3.5-kilogram mass are mounted on the ends of a light rod, as shown. The rod is attached so that it is free to rotate about its center point. A torque of 250 newton-meters is applied. What will be the angular acceleration?

5) Zollie attaches a 0.40-kilogram ball to a 30-centimeter string and swings it in a vertical circle so that its angular speed at the bottom of the circle is 21 revolutions per second. What is the tension in the string when the ball is at the bottom of the circle?

6) A small block whose mass is 0.9841 kilogram revolves in a circular orbit on a frictionless tabletop about a pin, as shown. The speed of the block is a constant 15.7770 meters per second, and the radius of the path is 50 centimeters. What is the tension in the string?

7) Three point masses are affixed to the surface of a massless table that can rotate without friction about its center, as shown. What torque is required to give the system an angular acceleration of 9.5 radians per second squared?

8) A 2.50-kilogram mass and a 9.00-kilogram mass are mounted on the ends of a lightweight rod, as shown. The rod is attached so that it is free to rotate about its center point. A torque of 600 newton-meters is applied. What will be the angular acceleration?